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Infrazonal belemnite stratigraphy of the Lower Callovian of the East European Platform

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The main result of the Jurassic biostratigraphy of European Russia achieved during the last two decades is the development of high-resolution infrazonal ammonite scales. Another cephalopod group, however, the belemnites, despite widely spread in the same deposits, do not allow detailed subdivision and consequently cannot provide precise age determinations. According to most actual schemes (Mitta et al. 2012) the whole Lower Callovian comprises a single belemnite zone, but the same interval contains 4 ammonite zones, the upper two of which are subdivided into 5 subzones, and more than 22 successive biohorizons (Gulyaev et al. 2002; Gulyaev & Ippolitov 2013; etc.). Unfortunately, published data on belemnites does not allow to review the stratigraphy, as most figured and determined specimens have indistinct positions in the sections, being tied in the best cases to ammonite zones.

During the 2011-2013 field seasons, the authors collected a huge number of belemnite rostra from many continuous sections in European Russia and Ukraine, together forming a full sequence of the Lower Callovian, well-characterized by ammonites. This material was studied biostratigraphically applying the concept of biohorizons (see Callomon 1985; Page 1995; Gulyaev 2002; Rogov et al. 2012; etc.). The remarkable point of this concept is that «ideally», phyletic biohorizons should represent successive elements of a single lineage.

The revision of the belemnite material has shown that the concept of phyletic biohorizons is fully applicable to the group. The Lower Callovian can be subdivided by belemnites into three parallel series of successive biohorizons, based on three different phyletic lines inside the boreal family *Cylindroteuthidae*, each covering a certain interval within the Lower Callovian and partly overlapping, so that in certain intervals, only one line can be used, while in other intervals two or even three. The number of successive units for the whole Lower Callovian is up to 14 biohorizons, which, in turn, can be grouped into 4 larger units (=zones), characterized by the well-recognizable appearance of the whole complex. Moreover, it is possible to select biohorizons based on immigration events, which are usually well-correlated with similar events in ammonites.

Thus, the concept of biohorizons looks to be fully applicable to belemnites, allowing to elaborate biostratigraphic scales, comparable in resolution with ammonite infrazonal scales.

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